

REMARKS

Claims 13-23 are pending in this application. Claims 1-12 have been canceled without prejudice and rewritten as new claims 13-23. New claims 13-23 find support throughout the specification, drawings, and claims as originally filed. No new matter has been added.

In view of the new claims and remarks set forth below, favorable consideration is respectfully requested.

I. 103 REJECTIONS:

A. At page 2, paragraph 2, of the Office Action, claims 1-4 and 9, have been rejected as being unpatentable over Huynh (US Patent No. 5,822,213).

The Examiner states that Huynh discloses a system for determining the center of rotation, and while Huynh does not disclose all of the ancillary features of the present claims, those features are implicit and/or inherent in Huynh in order to achieve rotation and inspection of the disk. A brief analysis of Huynh is set forth below.

Huynh determines the center of a substrate by detecting and measuring a difference in light intensity as the substrate makes a complete rotation, where light intensity is measured at a plurality of points at edge positions on the substrate.

Huynh teaches that as the substrate is rotated on the spindle, an image of the substrate's edge is projected onto the CCD array by the laser diode, where the CCD array continuously reads the

image of the edge and sends signals to the micro-controller, which calculates the center of the substrate relative to the rotation axis.

In the present apparatus, the center axis line is calculated after the center has been determined using the lifter, by rotating a wafer having a notch provided at a circumferential edge, through the path of the laser beam where no light is transmitted to the light receiving device until the notch is directly under the light emitting device in the optical path of the laser beam, where the beam reaches the light receiving device only through the notch. At this point rotation stops and a line is determined between the notch and the center of the wafer, which line is the center axis line of the wafer.

Huynh and the present apparatus/method as claimed, differ as follows: Huynh does not teach determining a center axis line; Huynh requires a lens 103 which shapes light from laser diode 102 into a thin sheet 116; Huynh does not disclose a lifting mechanism; and Huynh does not disclose clamping a wafer to a support via vacuum.

In view of the following, this rejection is believed to be overcome.

Claims 1, 2, and 3, have been rewritten as new **claim 13** to recite that the light passes from the source to the receiving device only through the notch provided on an edge of a substrate, and when the notch is not aligned, no light is received by the receiving device, and to recite a lifter, a lifting mechanism, and an inclined surface.

Claim 4 has been rewritten as new **claim 14**, to require that the substrate is clamped against the support mount via vacuum.

Claim 9 has been rewritten as new **claim 19** to clarify that the light passes from the source to the receiving device only through the notch provided on an edge of a substrate, and when the notch is not aligned, no light is received by the receiving device.

Regarding method **claim 19**, Huynh does not teach or suggest a method where a center is first determined and then the center axis line is determined, as required by present **claim 19**. Huynh determines the center of the substrate by imaging the edge of the substrate. Huynh does not teach a method of determining a center axis line, as presently required.

Regarding apparatus **claims 13-14**, Huynh does not teach determining a center axis line, rather Huynh determines the precise center of a substrate. In the present apparatus, the light emitting device and the light receiving device are disposed so as to allow light to pass to the light receiving device *only* through the notch. In Huynh, the edge of the substrate is continuously imaged all along its periphery, i.e., light is continuously received by the CCD array in order to determine the center of the disk. In Huynh, the light and the sensor are never disposed such that light is completely blocked by the substrate.

Accordingly, Huynh does not suggest determining a center axis line as presently required. Huynh does not suggest disposing a light and a sensor in an apparatus such that light is received only through a notch on a substrate, as presently required. Huynh does not suggest a lifter, a lifting mechanism, nor clamping the substrate to the support mount via vacuum, as presently required.

In view of the foregoing, it is submitted that nothing in Huynh renders the claimed invention obvious, within the meaning of 35 USC § 103. Thus, the Examiner is respectfully requested to withdraw this rejection.

B. At page 3, paragraph 4 of the Office Action, claims 5 and 10, have been rejected as unpatentable over Huynh in view of Bacchi (US Patent No. 6,438,460).

The Examiner communicates that it would have been obvious to modify the apparatus of Huynh to include the film thickness measuring apparatus of Bacchi because Bacchi discloses that such combinations were known at the time Bacchi was filed. A brief analysis of Bacchi is set forth below.

Bacchi discloses a specimen gripping end effector and a method of using such an effector to determine the thickness of a specimen. Bacchi does not disclose a method or apparatus for measuring the thickness of an electrically conductive thin film on the surface of a substrate, let alone an apparatus including an axis determination apparatus, as required by the present claims. Rather, Bacchi discloses determining "wafer thickness". See Bacchi at col. 14, line 3.

In view of the following, this rejection is believed to be overcome.

Claim 5 has been rewritten as new **claim 15** to recite that the light emitting device is disposed so as to receive a beam of light emitted by the light emitting device only through a notch provided on a circumferential portion of the substrate when the notch is aligned between the light

emitting device and the light receiving devices and the light-receiving device does not receive emitted light when the notch is not so aligned.

Claim 10 has been rewritten as new **claim 20** to more clearly set forth the present method where the substrate center is first determined.

It is submitted that the combination of Bacchi with Huynh is improper because there is no motivation, suggestion or incentive supporting the combination.

Huynh is concerned with precisely determining the physical center of a semiconductor wafer while avoiding prior art problems of inaccuracy, particulate contamination from contact with for example, pins, incoherent light, etc. Huynh overcomes these problems by providing an apparatus and an algorithm for precisely and accurately determining the physical center of a wafer.

Bacchi is concerned with determining the thickness of a wafer and with transferring wafers between a wafer cassette and a processing station, while avoiding the problems of wafer backside damage, accidental contact and insecure gripping of the wafer. The skilled artisan in view of Huynh would have no motivation to look to art concerned with transferring wafers during processing. Likewise, the skilled artisan in view of Bacchi would have no motivation to look to art concerned with the precise determination of a physical center, and not concerned with processing and transfer.

Further, assuming arguendo the combination proper, there is no suggestion to modify the teachings to obtain the presently claimed apparatus/method. At most, the combination suggests an apparatus for determining the center of a substrate surface and the thickness of the substrate. Such an invitation is experiment is not the proper standard for determining obviousness.

Huynh does not teach or suggest a method or apparatus for measuring the thickness of an electrically conductive thin film on the surface of a substrate, as required by present claims 15 and 20. Huynh does not suggest determining a center axis line as presently required. Huynh does not suggest disposing a light and a sensor in an apparatus such that light is received only through a notch on a substrate, as presently required.

Bacchi does not cure the deficiencies of Huynh because Bacchi does not teach or suggest a method or apparatus for measuring the thickness of an electrically conductive thin film on the surface of a substrate, as required by present claims 15 and 20. Further, Bacchi does not teach or suggest a light emitting device disposed so as to receive a beam of light emitted by the light emitting device only through a notch provided on a circumferential portion of the substrate when the notch is aligned between the light emitting device and the light receiving device, as presently required.

In view of the foregoing, it is submitted that nothing in Huynh or Bacchi, taken alone or together, renders the claimed invention obvious within the meaning of 35 USC § 103. Accordingly, the Examiner is respectfully requested to withdraw this rejection.

C. At page 4, paragraph 6 of the Office Action, claims 6-8 and 11-12, have been rejected as unpatentable over Huynh in view of Bacchi (US Patent No. 6,438,460), further in view of Le, (US Patent No. 6549,006).

The Examiner takes the position that it would be obvious to provide an apparatus and method for determining center axis line and thickness of Huynh and Bacchi, with the eddy current means of determining thickness as taught by Le.

Le is directed to eddy current measurements of thin-film metal coatings. In view of the following, this rejection is respectfully traversed.

It is submitted that a prima facie case of obviousness has not been established because the combination of references is improper. There must be some suggestion, motivation or incentive supporting the combination.

It is submitted that the combination of Huynh with Bacchi is improper, as discussed above. It is submitted that the combination of Le with Huynh and Bacchi is improper because there is no suggestion, motivation or incentive supporting the combination.

The skilled artisan in view of Bacchi would have no motivation to look to art directed to measuring thin films, since Bacchi is concerned with measuring wafer thickness in order to correctly orient and transfer the wafer. Likewise the skilled artisan in view of Le would have no motivation to look to Bacchi, because Bacchi does not measure nor is concerned with measuring the thickness of thin films.

Assuming arguendo the combination proper, none of the references, taken alone or together, teach or suggest an apparatus or method, for determining a center axis line, let alone for determining a center axis line and for measuring the thickness of a conductive thin film, as required by the present claims.


In view of the foregoing, it is submitted that nothing in any of Huynh, Bacchi or Le, taken alone or together, render the claimed invention obvious within the meaning of 35 USC § 103. Accordingly, the Examiner is respectfully requested to withdraw this rejection.

In view of the aforementioned amendments and accompanying remarks, claims, as amended, are in condition for allowance, which action, at an early date, is requested.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicants undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,
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